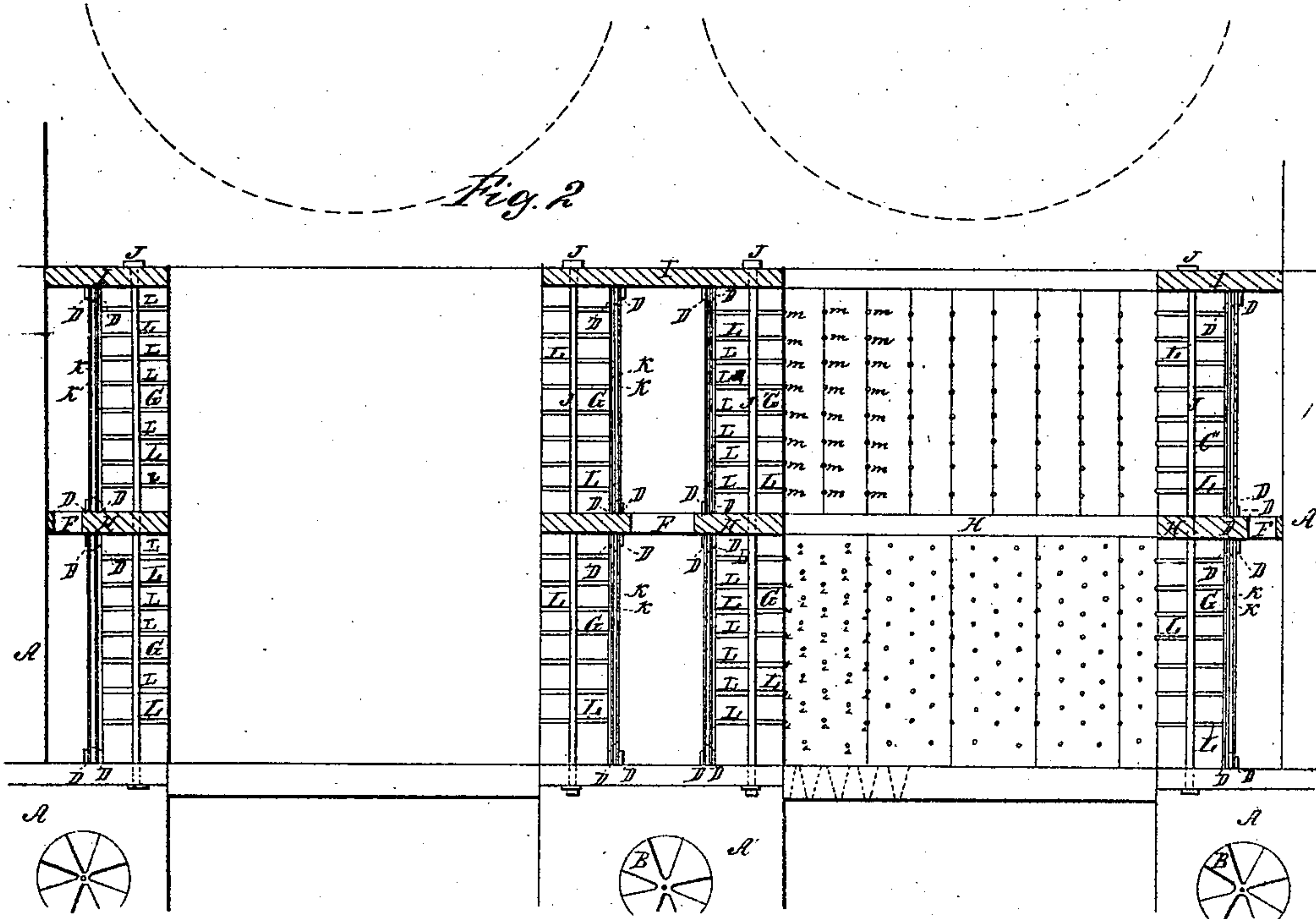
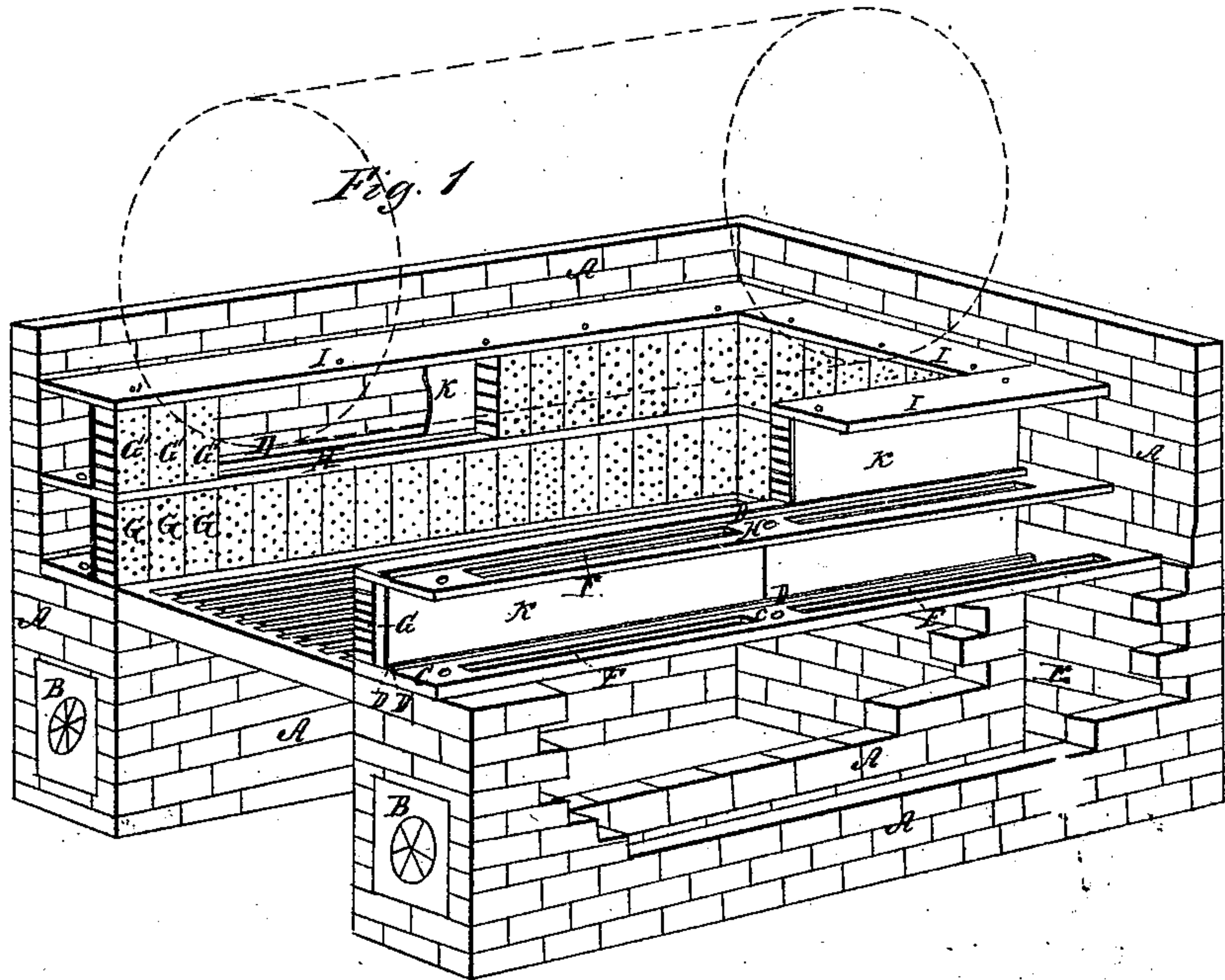


No. 81,222.

PATENTED AUG. 18, 1868.

S. SMITH.
STEAM BOILER FURNACE.



Witnesses
Wm. G. Brown
R. S. Turner

Inventor
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United States Patent Office.

SIDNEY SMITH, OF WORCESTER, MASSACHUSETTS.

Letters Patent No. 81,222, dated August 18, 1868.

IMPROVEMENT IN STEAM-BOILER FURNACES.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, SIDNEY SMITH, of Worcester, in the county of Worcester, and State of Massachusetts, have invented a new and useful Improvement in Fire-Chambers; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawing, in which—

Figure 1 is a perspective view of a fire-chamber with my invention, a portion of the walls being removed.

Figure 2 is a vertical cross-section of a double fire-chamber, showing the construction, &c.

In the drawing, the fire-chambers represented are intended for steam-generators, but I am not to be understood as confining myself to fire-chambers for that purpose, as I contemplate the use of my invention wherever it may be required to produce high degrees of heat.

In explanation of the principles of its operation, in producing intense combustion, reference is hereby made to the patent granted to me, July 31, 1866. In this patent I refer to my invention as consisting in the peculiar bricks employed, and in the manner of placing and securing them in position.

That others may understand my invention, its construction and operation, I will particularly describe it.

A is the brick or other wall enclosing the fire-chamber. The lower part of this wall, as high as the grate-bars, is built double, as shown in fig. 1, enclosing an air-space, which communicates with the external air by means of suitable valves or dampers B.

The inner portion of the wall A is capped by the iron plate C, which covers the air-space E, and is inserted a greater or less distance into the outer portion of the enclosing-wall A. The plate C, I will designate as the base-plate of the fire-chamber. It has along its upper surface, about two and a half inches from the inner edge, two or more parallel ribs, D D, and immediately over the air-space E (between the inner and outer-walls A A) there is a long slot, F, or a series of slots or holes, through which air may ascend from the space E.

The bricks G, which form the inner wall or surface of the fire-chamber, are set up on end upon the plate C, along the inner edge thereof, and in contact with the rib D, which is nearest that edge, said rib at that time acting as a guide, and assisting afterward to prevent any displacement of said bricks.

Upon the top of the row of bricks, G, is placed another plate of iron, H, which, if the wall of the fire-chamber requires to be higher than the length of one brick, is made precisely like the plate C, except that the ribs D are upon both sides, so that another row of brick, G' G', may be set upon the top of the plate H, as the row G was set up on the plate C. The plate H has also a slot, F, or a series of holes or slots, the same as the plate C, and for the same purpose.

The wall may be constructed, in this way, to the desired height, by successive rows of bricks and interposed plates H, and on the top of the upper row, the close cap-plate I is placed, having the ribs D on its lower side, but no slot F nor equivalent holes. The whole structure is then bound together by the tie-bolts J, which pass through corresponding holes in plates C H I, and are secured by screw-nuts.

Behind the bricks G G', fitting between the ribs D D, are the plates of perforated metal, K K, with very thin spaces of about one-fourth of an inch between them, and if the fire-chamber is intended for the production of high degrees of heat, these finely-perforated jacket-plates K are multiplied in number; that is to say, two, three, or more of them are placed, the one outside of the other, and having narrow spaces between.

The ash-pit being closed as tight as possible, air to support combustion is admitted only through the air-space E, behind the jacket-plates K, and reaches the interior of the fire-chamber, by passing through the perforations in the plates K, and through the perforations L L, made in the fire-walls G G', themselves, and the quantity of air so admitted is regulated and controlled by the dampers B.

The red lines in fig. 1 may be considered as representing the position of a steam-boiler.

When it is desired to set several boilers of the same size, side by side, as shown by red lines in fig. 2, I construct hollow fire-walls between the said boilers, as shown in fig. 2, in that case using plates exactly like C H I, except that rows of ribs, D, are made near each edge, so as to accommodate two rows of bricks and their perforated jackets.

The bricks G G' may be made of fire-clay, perforated as shown, and with grooves L across the edge, to form air-ducts, or they may be made of cast iron, which will withstand less degrees of heat than fire-clay. When made of iron, they may be cast in ingots one-half the size of the fire-brick, so that, in that case, the air-passages L may be made entirely by notches across the edge, as shown at M, fig. 2, and grooves may also be made lengthwise in the edge of the bricks, whether of clay or iron, in which the bolt J may be concealed.

For small fire-chambers, the walls may consist of one course only, instead of two or more, as may be required for large fire-chambers. They may be built also in any desired form, circular or angular, the plates C H I being cast to suit.

If it is desired to keep the ash-pit entirely open below, when two or more boilers are used, the walls between the ash-pits may be omitted, and the parting walls between the fire-chamber may be supported by the bearer, which also supports the grate-bars, and air may be introduced between them from an air-space at the rear, or from a valve or damper in front. These, however, are suggestions of modifications of arrangement only, and have no bearing to modify the nature or operation of the invention.

The grate-bars in my fire-chamber are employed simply as a convenient means of getting rid of the ashes without extinguishing the fire. They are not intended to serve for the admission of air to the fire, as the ash-pit is to be tightly closed, and the entire draught admitted through the perforated walls. The ash-pit is provided with closely-fitting doors, which are only to be opened when it is necessary to remove the accumulation of ashes in the ash-pit.

As a matter of convenience, when several perforated sheet-metal jackets K are to be employed, they may be attached, by rivets or otherwise, to strips of metal, which will keep separated at a proper distance, and enable them to be put in place all at one time, and will also prevent the displacement of the one which is nearest to the fire-wall, by the effects of the intense heat to which it may be exposed, as, when so attached together, the outer and cooler ones will support the inner and hottest one.

The advantages of my mode of construction may be partially enumerated, as follows:

The bricks or blocks of which the walls are constructed are of such size and proportion as will give them great durability and freedom from warping. By using base and cap-plates, and interposed plates, when more than one course is employed, and by binding these plates together with tie-rods, it is rendered easy to remove any block without disturbing the adjacent block, provided it is necessary to do so, by simply loosening the tie-bolts.

The interposed plates H keep the courses always separate, and uninfluenced by the courses above or below, and render it possible to build a fire-brick wall for a fire-chamber with an air-space behind it, which will prevent a great loss of heat by radiation, even though the heat radiated from the rear side of the fire-blocks should not be taken up and returned with the supporter of combustion, as is the case in this fire-chamber.

It is also easy to construct and finish the fire-walls before the encasing-walls A are built, and, if desirable, the fire-chamber may be made separate from those walls, so that it can be withdrawn therefrom entire for purposes of repair.

Having described my invention, what I claim as new, is—

1. A fire-chamber, with walls of perforated blocks, with perforated sheet-metal jackets behind said blocks, and said blocks and jackets secured between plates, substantially like plates C H I, by the rods J, so that the fire-chamber may be set up and its parts secured before the construction of the encasing-wall.

2. The blocks G G', made in the form and perforated as shown, to adapt them to the construction of a fire-chamber such as described.

3. The plates C and I, constructed as described, in combination with perforated fire-bricks, substantially as and for the purpose described.

Subscribed, this ninth day of May, 1868, in presence of—

SIDNEY SMITH.

Witnesses:

JOHN STEVENS, Jr.,

AMOS CUTTER